

INTERACTION OF WATER STRESS AND NODULATION IN BEAN LANDRACES

Riveiro, M.¹, A.M. De Ron ², J.J. Drevon³, A.P. Rodiño²

¹ Estación Experimental Agrícola do Baixo Miño, INGACAL. Pontevedra, Spain.

² Plant Genetic Resources Departament, Misón Biológica de Galicia-CSIC. Pontevedra, Spain.

³ UMR Rhizosphère et Symbiose. INRA. Montpellier, France.

Common bean (*Phaseolus vulgaris* L.) is often cultivated in unfavorable conditions and with minimal inputs. It is estimate that 60% of the bean crop is cultivated under risk of intermittent or terminal drought. The effects of drought on common bean are dependent on the intensity, type and duration of the stress. Due to the symbiotic nature of the legume-bacteria interaction for nitrogen fixation, effectiveness of the symbiosis to resist water deficit in the result of the combined capacity of both the plant and the specific rhizobial strain to cope with such stress. The existence of genetic variation in N₂ fixation response to water deficit among legume cultivars opens a real possibility for enhancing N₂ fixation tolerance to water deficit (TWD) through selection and breeding. The colonizing rhizobial bacteria also show marked variations in TWD. The objective of this work was coupling a selection of bean landraces that can be useful to improve TWD with the most efficient rhizobial strains. Ten common bean landraces and breeding lines from the MBG-CSIC bean collection were chosen and been inoculated each with ten different strains of *Rhizobium* sp. before planting in pots. Pots were subjected to two water regimes: more 90% field capacity (FC) and 60% FC. Two plants were harvested from each pot at the flowering stage, between 46 and 59 days after sowing, depending upon growth rate under greenhouse condition. Nodules were counted, and shoot and root separated. All components were dried at 70 °C for 48 h to determine their dry masses. The experimental design was a randomized complete block with ten cultivars, four strains (reference strain *R. tropici* CIAT899 and three local strains EG, APAFI and LTMF), two water regimes and two replications. In dry environment PMB-0244, PHA-0155 and PHA-0683 had the best results. Drought stress reduced biomass yield by a range between 2% and 64 %. PMB-0244 had the highest yield in drought conditions and the lowest percent reduction. The local strains had better performance in drought conditions than the reference strain. The LTMF strain showed, in general, a high biomass yield (BY) and high nodules mass. The APAFI strain was the most efficient strain in drought-stressed environment it had a little nodule mass and a high BY. And finally, the EG strain was the less efficient with little nodule mass and BY. The couples with best performance in drought-stressed environment were PHA-0155 with EG, PMB-0285 with APAFI and PHA-0483 with LTMF. These cultivars could be incorporated into programs of genetic improvement for resistance to water deficit. These programs have to include a selection of strains, compatible with these cultivars, as a crucial strategy to improve the efficiency of rhizobia-bean symbiosis in drought-stressed environment.

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References

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